

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	
DigitalGlobe, Inc.)	
)	File No. SAT-MOD-20040728-00151
Modification of Authorization to Construct,)	
Launch and Operate a Remote-Sensing Satellite)	
System)	

ORDER AND AUTHORIZATION

Adopted: September 30, 2005

Released: September 30, 2005

By the Acting Chief, Satellite Division, International Bureau:

I. INTRODUCTION

1. In this Order, we grant DigitalGlobe, Inc.'s (DigitalGlobe) application to modify its authorization for its Earth Exploration Satellite Service (EESS), nongeostationary orbit (NGSO) satellite system.¹ Specifically, we authorize DigitalGlobe to add three NGSO remote-sensing satellites, which will operate in the 8025-8400 MHz frequency bands, to its EESS system.² We also grant DigitalGlobe's request for a waiver of the modified processing round procedure for considering NGSO applications,³ and consider DigitalGlobe's application pursuant to the first-come, first-served procedure adopted in the *First Space Station Licensing Reform Order*.⁴ Grant of this application will allow for the delivery of enhanced next-generation imaging services to government and commercial users. This in turn will enhance national security, environmental monitoring and forecasting functions.

¹ DigitalGlobe Inc., Application to Modify Authorization, File No. SAT-MOD-20040728-00151 (DigitalGlobe Application).

² In this Order, we will occasionally refer to the 8025-8400 MHz band as the "X-band."

³ 47 C.F.R. §§ 25.156, 25.157.

⁴ Amendment of the Commission's Space Station Licensing Rules and Policies, *First Report and Order*, IB Docket No. 02-34, 18 FCC Rcd 10760 (2003) (*First Space Station Licensing Reform Order*).

II. BACKGROUND

A. Original License

2. In 1995, the International Bureau (Bureau) initially authorized DigitalGlobe⁵ to construct, launch and operate a remote-sensing satellite system in the EESS.⁶ This system consisted of two satellites, EarlyBird-1 and EarlyBird-2, which were authorized to operate in the 8305-8340 MHz frequency bands for EESS service, and in the 401.47-401.53 MHz (downlink) and 402.70-402.74 (uplink) MHz bands for tracking, telemetry and control (TT & C) operations.⁷ In December 1997, EarlyBird-1 was lost due to an in-orbit failure.⁸ DigitalGlobe decided not to proceed with the launch of EarlyBird-2.⁹

3. In April 1997, the Bureau granted DigitalGlobe a modification of its license to add two satellites, QuickBird-1 and QuickBird-2, to its EESS system. QuickBird-1 and QuickBird-2 were authorized to operate in the 8025-8345 MHz (downlink) frequency bands for EESS service.¹⁰ The Bureau also authorized DigitalGlobe to perform downlink TT & C operations for these two satellites in a 4.2 megahertz channel centered at 8030 MHz, and uplink TT & C operations in a 30 kilohertz channel in the 2025-2110 MHz band.¹¹ In November 1997, the Bureau granted DigitalGlobe authority to add a 300 kHz channel at each of the 2085.6875 MHz and 2094.896 MHz center frequencies.¹² In November 2000, QuickBird-1 was lost, due to a launch failure.¹³ Subsequently, DigitalGlobe launched QuickBird-2 successfully, renaming the satellite QuickBird-1.¹⁴ DigitalGlobe's current EESS system authorization consists of one in-orbit satellite, QuickBird-1.¹⁵

B. Modification Application

4. On July 28, 2004, DigitalGlobe filed an application to add three new NGSO satellites - WorldView 110A, WorldView 110B and WorldView 60 - and two on-ground spares to its EESS system. In its application, DigitalGlobe requests authority to operate these new satellites throughout the entire 375 megahertz of spectrum in the 8025-8400 MHz frequency band allocated for EESS space-to-Earth transmission.¹⁶ DigitalGlobe states that it can operate in this spectrum without causing interference to

⁵ DigitalGlobe's predecessor, EarthWatch, Incorporated, changed its name to DigitalGlobe in September 2001. For purposes of clarity we refer to the applicant as DigitalGlobe throughout this order.

⁶ See Application of EarthWatch Incorporated For Authority to Construct, Launch, and Operate a Remote-Sensing Satellite System, *Order and Authorization*, 10 FCC Rcd 10467 (1995) (*EarthWatch Authorization Order*).

⁷ *EarthWatch Authorization Order*, 10 FCC Rcd at 10468 (paras. 7-8).

⁸ See Letter to Shawn Thompson, Director, Legal Services, DigitalGlobe, Inc. 19 FCC Rcd 20415 (2004) (dismissing DigitalGlobe Application without prejudice to refilling) (*DigitalGlobe Letter*).

⁹ *DigitalGlobe Letter*, 19 FCC Rcd at 20417. See also DigitalGlobe Application at 2.

¹⁰ See EarthWatch Incorporated, *Order and Authorization*, 12 FCC Rcd 21637 (Int'l Bur., 1997) (*EarthWatch First Modification Order*).

¹¹ *EarthWatch First Modification Order*, 12 FCC Rcd at 21641 (para. 14).

¹² See EarthWatch Incorporated, *Order and Authorization*, 12 FCC Rcd 19556, 19558 (para. 6) (Int'l Bur. 1997) (*EarthWatch Second Modification Order*).

¹³ See EarthWatch Incorporated, *Order and Authorization*, 16 FCC Rcd 15985, 15985 (para. 3) (Int'l Bur., 2001) (*EarthWatch Fifth Modification Order*).

¹⁴ DigitalGlobe Application at 4.

¹⁵ *DigitalGlobe Letter*, 19 FCC Rcd at 20417.

¹⁶ DigitalGlobe Application at 6.

users in adjacent bands due to advances in sensor technology and satellite transmitting equipment.¹⁷ DigitalGlobe also requests a waiver of the modified processing round procedure for considering NGSO-like applications and requests that we consider its application pursuant to the first-come first-served procedure adopted in the *First Space Station Licensing Reform Order*.¹⁸

5. DigitalGlobe also seeks authority to update its EESS system by incorporating certain technical modifications to its remote-sensing operations.¹⁹ According to DigitalGlobe, such modifications are necessary to accommodate advances in remote-sensing satellite technology that have occurred since DigitalGlobe was first authorized to operate an NGSO EESS system. Specifically, DigitalGlobe seeks authority to: (1) modify its TT&C narrowband uplink in the S-band to 128 kilohertz of bandwidth at 2085.6875 MHz²⁰ and its TT & C downlink to a 2 megahertz channel at 8030 MHz; (2) operate its WorldView 60 satellite in an orbital altitude (*i.e.*, apogee and perigee) within 475-449 kilometers and with an inclination of 97.2 degrees; (3) operate its WorldView 110A and WorldView 110B satellites in an orbital altitude within 795-769 kilometers and with inclination of 98.5 degrees; (4) place the WorldView 110A satellite in orbit at an initial phase angle of 0°; and (5) place the WorldView 110B satellite in orbit at an initial phase angle of 180°.²¹ We placed DigitalGlobe's application on public notice. No comments were filed.

III. DISCUSSION

A. Processing Procedure

6. DigitalGlobe seeks a waiver of the modified processing round requirement, set forth in Sections 25.156 and 25.157 of the Commission's rules,²² 47 C.F.R. § 25.156 and 25.157, and requests that we process its application pursuant to the first-come first serve, procedure adopted for GSO-like satellite systems.²³ To accommodate multiple NGSO systems, which generally cannot operate on shared spectrum, the modified processing round procedure employs frequency band segmentation to assign spectrum among operators. DigitalGlobe argues that band segmentation is not necessary here because

¹⁷ DigitalGlobe Application at 6.

¹⁸ *First Space Station Licensing Reform Order*, 18 FCC Rcd at 10804-18 (paras. 108-50).

¹⁹ As required by Section 25.117(d), 47 C.F.R. § 25.117(d), of the Commission's rules, DigitalGlobe certifies that the physical, operational and orbital parameters of the three new, proposed NGSO satellites and two on-ground spare satellites are substantially similar to the parameters of DigitalGlobe's current NGSO satellite, QuickBird-1, with the exception of the technical changes detailed in FCC Form 312 S ("Schedule S"), attachment A to DigitalGlobe's application.

²⁰ DigitalGlobe asserts that modification of its downlink TT&C frequencies is needed to conform with current international standards set forth by the Consultative Committee for Space Data Systems (CCSDS). *See* DigitalGlobe Application at 7. The CCSDS is an organization of world space agencies, including the National Aeronautics and Space Administration (NASA), and develops standards and protocols for transmitting data in space. The Federal Communications Commission does not participate in the CCSDS standards development process, and generally does not require licensees to meet those standards. Therefore, we do not place any weight on whether DigitalGlobe meets CCSDS standards.

²¹ DigitalGlobe also seeks authority to construct two ground spares. DigitalGlobe Application at 2 and 4. The Commission no longer requires satellite operators to obtain authority to construct satellites. Streamlining the Commission's Rules and Regulations for Satellite Application and Licensing Procedures, *Report and Order*, IB Docket No. 95-117, 11 FCC Rcd 21581 (1996). Therefore, we dismiss this request as moot.

²² DigitalGlobe Application at 11.

²³ DigitalGlobe Application at 11.

EESS NGSO systems can share the same frequency bands.²⁴ DigitalGlobe asserts that EESS systems use tracking earth stations that provide discrimination between the target EESS satellite and potentially interfering satellites.²⁵ This means that EESS operators can operate on the same spectrum by downloading data from the satellites at different times or by downloading to earth stations in different geographic areas. In this regard, DigitalGlobe maintains EESS NGSO applications are more akin to GSO applications because NGSO EESS systems do not preclude additional EESS systems from operating in the same spectrum.²⁶ DigitalGlobe also notes that the Commission has currently authorized a number of competing EESS systems to use overlapping spectrum based on the ability of such licensees to coordinate their operations.²⁷

7. The Commission's rules may be waived when good cause is demonstrated.²⁸ The Commission may exercise its discretion to waive a rule where the particular facts make strict compliance inconsistent with the public interest.²⁹ In doing so, the Commission may take into account considerations of hardship, equity, or more effective implementation of overall policy on an individual basis.³⁰ Commission rules are presumed valid, however, and an applicant for waiver bears a heavy burden.³¹ Waiver of the Commission's rules is therefore appropriate only if special circumstances warrant a deviation from the general rule, and such a deviation will serve the public interest.³²

8. We conclude that there are special circumstances warranting a waiver of the modified processing round requirements. The Commission previously granted an NGSO-like EESS operator a waiver of the modified processing round rules in the *Space Imaging Order*.³³ In that Order, the Bureau determined that authorizing an EESS licensee to operate in a particular frequency band does not preclude other EESS licensees from operating in that band.³⁴ Moreover, such an authorization does not cause harmful interference to other EESS systems currently operating in band.³⁵ As a result, the Commission found there was no need to conduct a modified processing round for the requested spectrum and granted Space Imaging a waiver of the processing round requirement. Based on our review of DigitalGlobe's application, which presents similar circumstances, we conclude that DigitalGlobe's application warrants GSO-like treatment. We therefore waive Sections 25.156 and 25.157 of the Commission's rules³⁶ and consider DigitalGlobe's application under the first-come, first-served licensing procedure.

²⁴ DigitalGlobe Application at 12.

²⁵ DigitalGlobe Application at 12.

²⁶ DigitalGlobe Application at 13.

²⁷ DigitalGlobe Application at 12.

²⁸ 47 C.F.R. § 1.3; *see also WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969), *cert. denied*, 409 U.S. 1027 (1972) (*WAIT Radio*).

²⁹ *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164, 1166 (*Northeast Cellular*).

³⁰ *WAIT Radio*, 418 F.2d at 1159; *Northeast Cellular*, 897 F.2d at 1166.

³¹ *WAIT Radio*, 418 F.2d at 1157.

³² *Id.* at 1159.

³³ Space Imaging, LLC, *Declaratory Order and Order and Authorization*, DA 05-1940 (Int'l. Bur., released July 6, 2005) (*Space Imaging Order*).

³⁴ *Space Imaging Order* at para. 10.

³⁵ *Id.*

³⁶ 47 C.F.R. §§ 25.156, 25.157.

B. Legal Issues

1. Standard for Modifications

9. The Commission has traditionally designed its satellite licensing policies to be flexible enough to allow satellite operators to respond to changing technological, market, and regulatory conditions.³⁷ In particular, the Commission has determined that spacecraft design decisions should be left to each space station licensee, because the licensee is in a better position to determine how to tailor its system to meet the particular needs of its customer base.³⁸ If a proposal will not cause interference to other licensed operations, the Commission generally authorizes it if it is otherwise in the public interest.³⁹

10. DigitalGlobe maintains that its proposed modification will promote the development of a next-generation remote-sensing system capable of meeting future imagery needs of the United States for homeland security and civil uses.⁴⁰ DigitalGlobe further maintains that its proposal is expressly supported by the United States government as evidenced by the contract between DigitalGlobe and the National Geospatial-Intelligence Agency (NGA) for the construction of a satellite system and the provision of data for national security purposes.⁴¹ We agree with DigitalGlobe that its proposed modification will enhance competition in the market for commercial remote-sensing data and contribute to national security efforts without creating additional interference. Accordingly, we grant this modification request, subject to the conditions set forth below.

2. Milestones

11. In the *First Space Station Licensing Reform Order*, the Commission, noting that milestones are intended to ensure that licensees provide service to the public in a timely manner and to prevent warehousing of scarce orbit and spectrum resources, codified its generic milestone policy in Section 25.164 of its rules.⁴² The Commission has previously imposed milestone schedules on EESS licensees that have applied for modifications to add new satellites to their existing remote-sensing system authorizations.⁴³ Consistent with this precedent, we require DigitalGlobe to construct, launch and place its authorized satellites into operation in accordance with the technical parameters and terms and conditions of this authorization by the specified time periods prescribed in Section 25.164(b) for NGSO-like systems. Failure to meet any of those dates shall render this authorization null and void.

3. Bond

12. In the *Space Station Licensing Reform Order*, the Commission eliminated the financial requirements then in place and replaced them with a bond requirement. The bond requirement is intended to ensure that licensees are financially able and committed to implementing their licensed systems in a

³⁷ See Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service, *Memorandum Opinion and Order*, 3 FCC Rcd 6972, 6972 (para. 2) (1988).

³⁸ *EarthWatch Authorization Order*, 10 FCC Rcd at 10469 (para. 10).

³⁹ *EarthWatch Authorization Order*, 10 FCC Rcd at 10469 (para. 10), citing Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Non-Voice, Non-Geostationary Mobile-Satellite Service, *Report and Order*, CC Docket No. 92-76, 8 FCC Rcd 8450 (1993). See also 47 C.F.R. § 25.117 (d)(2) (codifying legal standard for satellite license modifications).

⁴⁰ DigitalGlobe Application at 4.

⁴¹ DigitalGlobe Application at 4.

⁴² 47 C.F.R. § 25.164.

⁴³ *EarthWatch First Modification Order*, 12 FCC Rcd at 21643 (para. 19).

timely manner. Under this requirement, any entity awarded a satellite license must execute a performance bond, payable to the U.S. Treasury, within 30 days of the date of the license grant. The bond is payable upon failure to meet any of the implementation milestones included in every license, where adequate justification for extending that milestone is not provided. Licensees may reduce the amount of the bond upon meeting each milestone.

13. We find that DigitalGlobe must file a bond for its next-generation satellite system, for two reasons. First, in the *Space Station Licensing Reform First Reconsideration Order*⁴⁴ the Commission clarified that satellite operators are not exempt from the bond requirement in circumstances where they propose to operate a next-generation satellite system using additional frequencies for which they are not currently authorized.⁴⁵ This is to ensure that licensees are committed to implementing all the spectrum on the next-generation system.⁴⁶ By posting a bond payable if the licensee does not implement the additional spectrum, we ensure that it is not “warehousing” the spectrum to use in the unlikely event “best case” demand scenarios materialize or to delay competitors from using it. Here, although properly filed as a modification to add additional NGSO satellites to a licensed NGSO constellation, DigitalGlobe is in fact requesting authority to launch and operate three new satellites in frequency bands that are not part of its current system authorization. Therefore, DigitalGlobe is required to post a bond.⁴⁷

C. Technical Issues

1. Default Service Rules

14. In the *First Space Station Licensing Reform Order*, the Commission determined that it would consider applications for satellite service after a particular domestic frequency allocation had been adopted, but prior to the adoption of frequency-band-specific service rules for that allocation. As part of this policy, the Commission established a set of “default service rules,” which apply to satellite facilities that operate in frequency bands in which the Commission has yet to adopt service-specific rules. In adopting the default rules, the Commission stated that where the default rules are not appropriate in a particular case, they would be superseded by subsequently adopted service rules.⁴⁸

15. Although the Commission has not adopted band specific service rules for EESS NGSO operations in the X-band, the Commission has previously granted a waiver of the default service rules in Section 25.217(b) to an NGSO EESS system licensee. Specifically, in the *Space Imaging Order*, the Commission concluded that EESS in the X-band operators are required to comply with technical requirements in Part 2 of the Commission’s rules,⁴⁹ and the applicable ITU rules. Based on its determination that these requirements have been sufficient in the past to prevent harmful interference in the X-band, the Bureau declined to impose additional technical requirements on X-band operations and granted Space Imaging a waiver of Section 25.217(b) of the Commission rules.⁵⁰ For the same reasons,

⁴⁴ Amendment of the Commission’s Space Station Licensing Rules and Policies, *First Order on Reconsideration and Fifth Report and Order*, IB Docket No. 02-34, 19 FCC Rcd 12637, 12658 (para.57) (2004) (*Space Station Reform First Reconsideration Order*).

⁴⁵ *Space Station Reform First Reconsideration Order*, 19 FCC Rcd at 12658-59 (para. 58).

⁴⁶ *Space Station Reform First Reconsideration Order*, 19 FCC Rcd at 12658-59 (para. 58).

⁴⁷ DigitalGlobe is currently authorized to operate in 320 MHz, for data downlink operations in the 8025-8345 MHz band, *see EarthWatch First Modification Order*, 12 FCC Rcd at 21641 (para. 11) and requests authority to operate in 375 MHz, in the 8025-8400 MHz band. DigitalGlobe Application at 6.

⁴⁸ *First Space Station Licensing Reform Order*, 18 FCC Rcd at 10786 (para. 55).

⁴⁹ 47 C.F.R. § 2.106, footnote 258.

⁵⁰ *Space Imaging Order* at para. 25.

we grant DigitalGlobe a waiver of the default service rules contained in Section 25.217(b) of the Commission's rules.

2. QuickBird-1 Frequency Assignment

16. In the narrative section of its application, DigitalGlobe requests authority to increase the spectrum currently authorized to QuickBird-1 from 320 megahertz to 375 megahertz. DigitalGlobe failed to provide the supporting technical information necessary to allow us to act on this request. In particular, we note that DigitalGlobe provided specific technical information for its spectrum assignment requests for WorldView 110B, WorldView 110A, and WorldView 60, but omitted similar information specific to QuickBird-1. We require specific technical information such as the emission designator, assigned bandwidth and signal modulation parameters so that we may begin the interagency coordination process that ensures commercial and government operations in the X-band do not interfere with each other. Without this technical information, we cannot authorize DigitalGlobe's request to operate QuickBird-1 in the 8345-8400 MHz band and dismiss that portion of its application without prejudice to refiling.

3. Tracking, Telemetry & Control

17. DigitalGlobe proposes to operate a 128 kilohertz channel at the 2085.6875 MHz center frequency for its uplink TT & C operations. In the U.S. Table of Frequency Allocations, this band is allocated to authorized non-government systems operating in the EESS for Earth-to-space transmission.⁵¹ Specifically, US Footnote 347 allows EESS operations in this band on a non-interference basis with other allocated services. We note that DigitalGlobe's proposed use of the 128 kHz channel at 2085.6875 MHz for uplink TT & C is similar to the authorized uplink TT & C for QuickBird-1, except that the proposed 128 kilohertz bandwidth is smaller than the bandwidth for which QuickBird-1 is currently authorized (300 kilohertz). Thus, we apply the same conditions imposed on QuickBird-1's S-band operations to the WorldView-110A, WorldView-110B and WorldView-60 satellites. Specifically, DigitalGlobe will be required to conduct its TT & C operation in the 2085.6235-2085.7515 MHz frequency band on a non-harmful interference basis with respect to all other systems operating on a primary or secondary basis, in accordance with the U.S. Table of Frequency Allocations.

18. DigitalGlobe also proposes to use a 2 megahertz channel at the 8380 MHz center frequency for its downlink TT & C for WorldView-60, WorldView-110A, and WorldView-110B. This proposed 2 megahertz bandwidth channel is smaller than the bandwidth for which DigitalGlobe is currently authorized for downlink TT & C operations with QuickBird-1, *i.e.*, a 4.2 megahertz channel at the 8030 MHz center frequency. As such, DigitalGlobe's proposed operations will not increase the potential for interference with other operators in these bands. Accordingly, we grant DigitalGlobe authority to conduct its downlink TT & C operations for its WorldView-60, WorldView-110A, and WorldView-110B on a 2 megahertz channel at the 8380 MHz frequency.

4. Orbital Parameters

19. DigitalGlobe proposes to operate its three new satellites at the following orbital parameters: (1) WorldView 60 at an orbital altitude of 475-449 km, an inclination⁵² of 97.2° degrees, and an initial phase angle⁵³ of 0°, (2) WorldView 110A at an orbital altitude of 795-769 km, an inclination of

⁵¹ 47 C.F.R. § 2.106, US Footnote 347.

⁵² The inclination of an orbit is the angle between the orbital plane and the Earth's equatorial plane, measured counter-clockwise. A zero inclination orbit would mean the satellite is orbiting directly over the equator; an inclination of 90 degrees is a perfectly polar orbit.

⁵³ The "phase angle" is defined as the angle between the two lines connecting, respectively, the satellite with the sun and the satellite with the observer. If this angle is 0°, the satellite will be "fully lit", and just like the full Moon, will
(continued....)

98.5° degrees, and an initial phase angle of 0°; (3) WorldView 110B at an orbital altitude of 795-769 km, an inclination of 98.5° degrees, and an initial phase angle of 180°.⁵⁴

20. We find that these proposed technical modifications do not present an increased risk of harmful interference to other operators in the X-band and are not otherwise inconsistent with the public interest. We therefore grant DigitalGlobe authority to operate its new satellites in accordance with its proposed orbit parameters.

5. Sharing Issues in the 8025-8400 MHz Band

21. As noted above, DigitalGlobe proposes to operate in the 8025-8400 MHz frequency band to transmit data collected from its satellites for transmission to its receiving earth stations. In the U.S. Table of Frequency Allocations, the 8025-8400 MHz frequency band is allocated by footnote on a primary basis to non-government EESS in the United States, subject to a case-by-case electromagnetic analysis of compatibility with United States government and other authorized operations in the band.⁵⁵ This frequency band also is allocated on a co-primary basis to government Fixed, Fixed-Satellite (FSS), and EESS, and on a secondary basis to government Mobile-Satellite Service (MSS). In addition, the 8175-8215 MHz band is allocated on a co-primary basis to government Meteorological-Satellite (Earth-to-space) service (MetSat). We address the sharing criteria as it relates to each of these services below.

22. *Sharing with Government Operations.* We have coordinated DigitalGlobe's proposed operations with NTIA through the frequency assignment and coordination practices established by NTIA and the Interdepartment Radio Advisory Committee (IRAC). NTIA has approved DigitalGlobe's proposed operations with WorldView-110A, WorldView-110B, and WorldView-60.⁵⁶

23. *Sharing with Fixed Service Systems.* Generally, sharing between satellite downlinks and the fixed service is accomplished through power flux density (PFD) limits. The Commission's rules do not contain power flux-density limits for non-geostationary EESS satellite systems in the 8025-8400 MHz band. However, Table 21-4 of the ITU Radio Regulations states that the PFD at the Earth's surface produced by emissions from an EESS space station in this band, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the following values:

- 1) $-150 \text{ dB(W/m}^2\text{)}$ in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;
- 2) $-150 + 0.5(\delta-5) \text{ dB(W/m}^2\text{)}$ in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane;

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show the largest illuminated area to the observer. A satellite will be brighter for smaller phase angles (generally, less than 90°), and becomes fainter as the angle approaches 180°. At large phase angles, as with a new Moon, much less light is reflected, thus making the satellite fainter.

⁵⁴ See DigitalGlobe Application, Technical Appendix, Schedule S, page 2.

⁵⁵ See 47 C.F.R. § 2.106; Footnote US 258.

⁵⁶ DigitalGlobe states it can safely use the entire 375 megahertz (8025 to 8400 MHz) allocated for EESS space-to-Earth operations without causing interference to users in the adjacent bands due to advances in satellite transmitting equipment. In this regard, DigitalGlobe states that, although the center frequency at 8185 MHz is not the arithmetic mean, DigitalGlobe has implemented an output filter to ensure that its use of the spectrum is limited to the band from 8025 MHz to 8400 MHz and that emissions are within acceptable levels. Specifically, the output filter will ensure that the emissions at the outer bands of the frequency are within the limits provided in the Commission's regulations. See DigitalGlobe Application at 9.

- 3) $-140 \text{ dB(W/m}^2\text{)}$ in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane;

These limits relate to the power flux-density that would be obtained under assumed free-space propagation conditions. We have reviewed the PFD information provided by DigitalGlobe's in its application, and conclude that DigitalGlobe's proposed operations with WorldView-60, WorldView 110B, and WorldView 110A meet the ITU PFD limits.

24. *Sharing with Earth-to-space FSS and MetSat Systems.* There is a potential for interference from the downlinks of DigitalGlobe's satellites into the uplinks of FSS and MetSat geostationary satellites in the 8025-8400 MHz band. To provide adequate protection to the FSS and MetSat uplinks Article 22.5 Section 4 of the ITU Radio Regulations contains a PFD limit at the geostationary orbit.⁵⁷ Based on our review of the technical information DigitalGlobe provided in its application,⁵⁸ we find that DigitalGlobe's proposed operations comply with the ITU limits.

25. *Sharing with other EESS systems.* Interference between EESS systems operating in this band occurs very infrequently, if at all, due to the characteristics of the systems and their earth stations operating in the band. In cases where the potential for interference exists due to the orbits of the EESS space stations being such that they will pass through the earth station antenna beamwidth simultaneously, operational coordination can be pursued to ensure that there is no harmful interference between the systems. As the EESS satellite is programmed to transmit only to the Earth stations to which it is downloading data, the satellite can be programmed to avoid transmissions in the unlikely case that there is the potential for interference to another EESS downlink at a certain point in time. In the past, we have conditioned EESS licenses on the completion of this coordination.⁵⁹ We grant this authorization subject to the same condition.

6. Orbital Debris Mitigation

26. As part of its default service rules, the Commission adopted standards for end-of-life satellite disposal, designed to mitigate orbital debris.⁶⁰ DigitalGlobe states that, as part of its authorization to operate a remote sensing satellite system under the Land Remote Sensing Policy Act,⁶¹ it filed a plan for post-mission disposal of its satellite system with the National Oceanic and Atmospheric Administration (NOAA). DigitalGlobe confirms that NOAA has already accepted its post-mission disposal plan and approved its operation of the next generation remote sensing satellite system covered by the instant application. Because it has previously filed a plan for mission disposal plan which has been

⁵⁷ Article 22.5 § 4 of ITU Radio Regulations states that "in the frequency band 8 025-8 400 MHz, which the Earth exploration-satellite service using non-geostationary satellites shares with the fixed-satellite service (Earth-to-space) or the meteorological-satellite service (Earth-to-space), the maximum power flux-density produced at the geostationary-satellite orbit by any Earth exploration-satellite service space station shall not exceed $-174 \text{ dB(W/m}^2\text{)}$ in any 4 kHz band." It is assumed that this same PFD limit will also protect the secondary MSS (earth-to-space) systems in the band.

⁵⁸ DigitalGlobe Application, Attachment B, Appendix 2 Power Flux Density; Wideband Downlink and Appendix 5 Flux Density; Narrowband Downlink.

⁵⁹ See *EarthWatch First Modification Order*, 12 FCC Rcd at 21641 (para. 11).

⁶⁰ 47 C.F.R. § 25.217(d). Under this requirement, satellite applicants must submit a narrative statement describing the orbital debris design and mitigation strategies they plan to use, and to submit a casualty risk assessment if their planned post-mission disposal involves atmospheric reentry of the spacecraft. Later, in 2004, the Commission adopted more detailed orbital debris requirements. See 47 C.F.R. § 25.283. See also *Mitigation of Orbital Debris, Second Report and Order*, IB Docket No. 02-54, 19 FCC Rcd 11567 (2004) (*Orbital Debris Mitigation Order*).

⁶¹ 15 U.S.C. §5601 *et seq.*

approved by NOAA, DigitalGlobe requests a waiver of Section 25.217(d) of the Commission's rules, which requires certain licensees to submit orbital debris mitigation disclosure with their applications.⁶²

27. We conclude that DigitalGlobe has demonstrated good cause for a waiver of the Commission's orbital debris disclosure requirements.⁶³ In adopting the orbital debris disclosure requirements, the Commission specifically found that there was no additional benefit to reviewing the post-mission disposal plans of commercial remote sensing satellite applicants when such plans are already subject to effective regulatory review by NOAA.⁶⁴ Thus, the Commission concluded that, to the extent that a remote sensing satellite applicant has submitted its post-mission disposal plans to NOAA for review and approval, the Commission would not require submission of such information.⁶⁵ The Commission further stated, however, that with respect to elements of debris mitigation other than post-mission disposal for which NOAA has not received information necessary for review and approval, it would require remote sensing satellite applicants to submit such information as part of an application for a Commission license, and would review any such aspects of a remote sensing applicant's debris mitigation plans that are outside the scope of NOAA review.⁶⁶

28. In this instance, DigitalGlobe has already submitted a post-mission disposal plan to NOAA as part of its licensing process.⁶⁷ Thus, DigitalGlobe is not required to provide a full disclosure plan to the Commission. Moreover, based on our review of the supplemental Orbital Debris Mitigation statement provided in DigitalGlobe's application, we find that DigitalGlobe need not further supplement its NOAA post-mission disclosure plans at this time. Accordingly, we grant DigitalGlobe's request for waiver of Section 25.217(d) of the Commission's rules.

IV. ORDERING CLAUSES

29. Accordingly, IT IS ORDERED that, subject to the conditions set forth in this Order, Application File No. SAT-MOD-20040728-00151 IS GRANTED and DigitalGlobe, Inc. IS AUTHORIZED to construct, launch, and operate three additional space stations in the Earth Exploration Satellite Service to operate in the 8025-8400 MHz frequency band, and to conduct uplink tracking, telemetry and control (TT & C) in a 128 kilohertz channel at 2085.6875 MHz center frequency and downlink TT & C in a 2 megahertz channel at 8380 MHz center frequency, in accordance with the technical parameters set forth in the its Application and the terms and conditions set forth in this Order.

30. IT IS FURTHER ORDERED that, unless extended by the Commission for good cause shown, this authorization will become null and void in the event the space stations are not constructed and launched in accordance with this application by the dates set forth in Section 25.164(b) of the Commission's rules.

- A: Enter into a binding non-contingent contract to construct the licensed satellite system by October 2, 2006.
- B: Complete the Critical Design Review of the licensed satellite system by September October 1, 2007.
- C: Begin the construction of the first satellite by March 30, 2008.

⁶² DigitalGlobe Application at 10.

⁶³ 47 C.F.R. § 1.3.

⁶⁴ *Orbital Debris Mitigation Order*, 19 FCC Rcd at 11609 (paras. 102-104).

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ See DigitalGlobe Application at 4.

- D: Launch and begin operations of the first satellite by March 30, 2009.
E: Bring all the satellites in the licensed satellite system into operation by September 30, 2011.

31. IT IS FURTHER ORDERED that, DigitalGlobe Inc. must file a bond the Commission in the amount of \$5,000,000.00 pursuant to the procedures set forth in Public Notice, DA 03-2602, 18 FCC Rcd 16283 (2003), within 30 days of the date of this grant.

32. IT IS FURTHER ORDERED that, DigitalGlobe Inc.'s request to operate QuickBird-1 in the 8345-8400 MHz band is DISMISSED.

33. IT IS FURTHER ORDERED that, pursuant to Section 1.3 of the Commission's rules, 47 C.F.R. § 1.3 that DigitalGlobe, Inc. IS GRANTED a waiver of Sections 25.156 and 25.157 of the Commission's rules, 47 C.F.R. §§ 25.156, 25.157, to the extent necessary to enable the Bureau to consider its EESS application on a first-come, first-served basis as set forth in Section 25.158 of the Commission's rules, 47 C.F.R. § 25.158.

34. IT IS FURTHER ORDERED that, DigitalGlobe, Inc. is afforded 30 days from release of this Order to decline this authorization as conditioned. Failure to respond within that period will constitute formal acceptance of the authorization as conditioned.

35. IT IS FURTHER ORDERED that, DigitalGlobe shall prepare the necessary information, as may be required, for submission to the International Telecommunications Union (ITU) to initiate and complete the advance publication, international coordination, due diligence, and notification process of these space stations, in accordance with the ITU Radio Regulations. DigitalGlobe shall be held responsible for all cost-recovery fees associated with these ITU filings. We also note that no protection from interference caused by radio stations authorized by other administrations is guaranteed unless coordination and notification procedures are timely completed or, with respect to individual administrations, by successfully completing coordination agreements. Any radio station authorization for which coordination has not been completed may be subject to additional terms and conditions as required to effect coordination of the frequency assignments of other administrations. *See* 47 C.F.R. § 25.111(b).

36. This Order is issued pursuant to Section 0.261 of the Commission's rules on delegated authority, 47 C.F.R. § 0.261, and is effective upon adoption. Petitions for reconsideration under Section 1.106 or applications for review under Section 1.115 of the Commission's rules, 47 C.F.R. §§ 1.106, 1.115, may be filed within 30 days of the date of the Public Notice announcing that this action was taken.

FEDERAL COMMUNICATIONS COMMISSION

Cassandra C. Thomas
Acting Chief
Satellite Division